Software Requirements Specification

The Teleservices and Remote Medical Care System (TRMCS)

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**1. Introduction**

The document aims to enlist the requirements gathered for the development of the teleservices and remote medical care system.

* 1. **Purpose**

The purpose of the TRMCS system is to provide and guarantee assistance services to at home or mobile users. This requirement specification document studies and describes every feature that are to be included while developing “The teleservices and remote medical care system” application. The functional, non-functional and global constraints of TRMCS are included in this. This document will aid the developer to develop the application as per the descriptions provided.

* 1. **Scope**

The TRMCS is an application that can be operated over the web by users either from their mobiles or from their home PCs. The application should be able to store patient details and provide the necessary details only to the appropriate people. The details of the patients are to be kept confidential and can be disclosed only to the authorised person. This application should be available whole of the time for the users to access, store and retrieve information.

The system should allow the patients to raise help requests which goes to the assistance centre. Multiple users should be able to use the system at the same time. The assistance centre should be able to view the requests raised by other users and to provide resolutions to them.

Furthermore, the system should provide access to any user trying to use it from any part of the world. It should also allow same users to access it from different locations. It should handle the changes dynamically and the system should provide the history log and maintain a persistent repository of data.

* 1. **Definitions, acronyms and abbreviations**

Table 1. Definitions

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| --- | --- |
| **Term** | **Definition** |
| User | Anyone who interacts with the application. It can be a patient, an assistance centre executive or a doctor trying to access the patient information. |
| Administrator | The user who has got the super user privileges to access the logs, data repositories and to provide or revoke the privileges of other users or user groups. |
| Patient | A user who is ill and raises a request/query in the system to seek help/advice from the assistance centre. The patient can also be someone who registers into the system to make use of the healthcare services offered by the system. |
| Web based UI | An application user interface(UI) that can be accessed from the web irrespective of it being used from a mobile or from a personal computer. |
| TRMCS | The Teleservices and Remote Medical Care System |

* 1. **References**

1. IEEE Software Engineering Standards Committee, “IEEE Std 830-1998, IEEE Recommended Practice for Software Requirements Specifications”, October 20, 1998
2. Sample Case Study shown in tutorial available online from “http://www.cse.chalmers.se/~feldt/courses/reqeng/examples/srs\_example\_2010\_group2.pdf”
3. Minjie Zhang, “Lecture 1 - Introduction of Requirement Engineering”, Unpublished for public but accessible for UOW CSCI910 enrolled students.
4. The article “Moscow or Kano - how do you prioritize?” retrieved from https://www.hotpmo.com/blog/moscow-kano-prioritize on March 13, 2017.
5. The article “Regulation of medical software and mobile medical 'apps'” retrieved from <https://www.tga.gov.au/regulation-medical-software-and-mobile-medical-apps> on March 16, 2017.
   1. **Overview**

The different sections following this section describes the product in detail. The first section aims to enlist the product constraints. This includes descriptions of the purpose of the product, descriptions about the client, customer and other stakeholders of the system. The details such as the naming conventions, abbreviations, description of terms used in this document and the references used to prepare this document are listed above.

The next section following this will describe the functional requirements of the product which includes the scope of the product, the functional and data requirements.

The third section will cover the non-functional requirements. This initially describes the look and feel of the system. It then describes the usability requirements, performance requirements, operational requirements, maintenance and portability requirements, security requirements and the cultural and political requirements.

The fourth and pre-final section enlists the legal requirements of the system which are primarily adapted from the requirement details shared and from the official website of the Australian Government’s Australian Register of Therapeutic Goods (ARTG).

The final section describes the project issues. This includes the open issues, off-the-shelf solutions, new problems, tasks, cutover and risk estimation during the process of development of the system.

**2. Overall Description**

The whole system is described in this section. The interactions with other systems and its basic functionalities are described as well. This section will also detail how each set of stakeholders will be using the system. The constraints and assumptions for the system will be presented at the end.

**2.1 Product Description**

The system should perform its task even if it is being operated from a personal computer or from a mobile. It should be available whole of the time for the stakeholders. The patients should be able to create their accounts and register into the system. The system should maintain their records.

The system should allow the patient to raise a request which will go to the help centre. The system should allow the help assistant to provide the optimal resolution by directing the patient to the health professional within a critical time range. The health professional should be capable of logging into the system remotely and diagnose the patient online with the help of the system.

The system should also handle the inputs coming from the devices such as EKG and EEG which are used to monitor the patients. In case of emergencies, a health professional should be assigned to look after the patient and to provide medical assistance as early as possible.

The system should maintain a log of the activities which are being performed to establish that it was up and running if there arises a controversial situation. Additionally, patients should be able to choose services based on their economic capabilities. The system should also provide options to approve or reject a new help centre which would perform as the point of assistance to help the patients when they raise a request in the system or when an alert is generated by the patient monitoring system.

**2.2 Product Functions**

Users would be able to get medical attention and advise from a medical practitioner by logging into the system and raising a help request. The help centre representative will guide the user to the right medical practitioner based on the patient’s medical history and budgets.

The system will allow the user to choose from multiple options if there arises a situation where there are multiple medical practitioners available matching the patient’s criteria. In such a situation, the details would be listed as a map view or a list view from which the patient reserves the right to choose the appropriate medical practitioner. The map view will point the location of each medical practitioner with the location proximity from the place from where the patient has currently logged in from. The patients could get directions to the place by clicking on the balloon popped up from the location.

The system will also provide options for new medical practitioners and new patient help assistants to register into the system. They are to be approved by a government authorised person to handle the cases related to the patient.

**2.3 User Characteristics**

There are five different users within the system. They are the patients, help assistants, government agents, medical practitioners and the administrators.

The patients are the kind of users who primarily benefit from the system. They create accounts in the system and raises help requests related to their health issues. The system manages the patient information and maintains the confidentiality of the same.

The help assistants respond to the concerns raised by the patients and redirects them to the right medical practitioner.

The government’s agent approves new help assistants when new help assistant agencies register with the system. They will be able to respond to the requests raised by the patient only after this approval.

The medical practitioners are the ones who analyses the patient’s medical records and provide medications based on the medical history and patient details available in the repository of the system.

The administrators can manage the users and user groups. They can also extract the logs from the system and can trace the activity log of any user within the system.

**2.4 Constraints**

The users should access the application from different locations. Therefore, the program should identify the current location of the user and suggest results based on the location proximity. The user’s device should provide the location details to the system as an input for this feature to function effectively. If the system cannot identify the location, the suburb provided by the user during registration should be used as the location for the user.

The system requires internet connectivity to function since the data related to the patients and other stakeholders are all stored in the repository which is available online. The system is web based and hence it won’t function in offline mode.

**2.5 Assumptions and Dependencies**

The application requires good network speed since the details are fetched and stored in an online system. The network bandwidth will be consumed for the transactions to occur and hence it is assumed that each user has got a good internet connection.

Another assumption is that all the patients using the system are literate enough to handle the application and its components.

**2.6 Apportioning of Requirements**

The ‘Must-Have’ requirements as mentioned in the section that follows are to be developed with the highest priority. It should follow the ‘Should-Have’ requirements. They are as important as must have requirements but may not be as critical as the must have requirements. The ‘Could-Have’ requirements are the good to have requirements which can improve the user experience and these can be developed and implemented even later as an enhancement to the system.

**3. Functional and Data Requirements**

The functional requirements of the system are enlisted in this section.

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| **Requirement #: FR1.1** | **Requirement Type:** Functional Requirement |
| **Description:** The system should provide patients with a privilege to create accounts. | |
| **Rationale:** Patients must create an account to use the system. | |
| **Source:** Patient | |
| **Fit Criterion:** The patients should be capable of successfully creating accounts. | |
| **Dependencies:** The profile should be created in the system. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR1.2** | **Requirement Type:** Functional Requirement |
| **Description:** The system should be able to access the system from their home. | |
| **Rationale:** Patients must be able to login into the system from their homes. | |
| **Source:** Patient | |
| **Fit Criterion:** The patients should be capable of successfully login from any location and use the system. | |
| **Dependencies:** The system should identify the medical practitioners close to the patient’s location. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR2.1** | **Requirement Type:** Functional Requirement |
| **Description:** The system should store medical information of the patients. | |
| **Rationale:** Patients and medical practitioners should feed medical information of the patients into the system. | |
| **Source:** Help Centre | |
| **Fit Criterion:** The help centre should be able to identify the prior medical information about each user registered with it. | |
| **Dependencies:** The system should maintain a medical record of the patients. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR2.2** | **Requirement Type:** Functional Requirement |
| **Description:** The system should allow a patient to raise a help request to a help centre. | |
| **Rationale:** Patients should be able to raise a help request for emergency ambulatory service or online diagnosis and treatment from a health professional at a distance. | |
| **Source:** Help Centre | |
| **Fit Criterion:** The help centre should be able to identify the location and aid the patient within a critical time range. | |
| **Dependencies:** The help centre should respond within the critical time range. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR2.3** | **Requirement Type:** Functional Requirement |
| **Description:** The system should allow devices connected to a patient to raise a help request to a help centre. | |
| **Rationale:** EKG, EEGand other monitoring software and devices connected to the patients should be able to raise a help request for emergency ambulatory service or online diagnosis and treatment from a health professional at a distance. | |
| **Source:** Help Centre | |
| **Fit Criterion:** The help centre should be able to identify the location and aid the patient within a critical time range. | |
| **Dependencies:** The device should identify the emergency and raise a request for the help centre to respond within the critical time range. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR3.1** | **Requirement Type:** Functional Requirement |
| **Description:** System should allow a medical practitioner to respond to the medical needs of a patient. | |
| **Rationale:** Medical practitioner should respond to the help centre and attend to the medical needs of the patient. | |
| **Source:** Help Centre | |
| **Fit Criterion:** Medical practitioner should be able to diagnose the patient and provide the right medication. | |
| **Dependencies:** The response time should be within the critical time range. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR3.2** | **Requirement Type:** Functional Requirement |
| **Description:** System should allow a medical practitioner to feed the details of the medication provided into the system. | |
| **Rationale:** Medical practitioner should be able to enter the details of the treatment provided which would act as prior medical information upon the patient’s next help request. | |
| **Source:** Medical Practitioner | |
| **Fit Criterion:** Medical practitioner should be able to store the details into the system. | |
| **Dependencies:** The details should get saved into the system. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR4.1** | **Requirement Type:** Data and Functional Requirement |
| **Description:** System should store a history of intercommunication information. | |
| **Rationale:** The log should be used to certify that the system correctly behaved in controversial situations. | |
| **Source:** Admin | |
| **Fit Criterion:** The date, hour, type of request, user requesting the service and state of the service must be stored into the system. | |
| **Dependencies:** The admin should be able to analyse the log of any activity performed at any time. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR4.2** | **Requirement Type:** Functional Requirement |
| **Description:** System should allow a user to raise a concern if they felt that the help centre had not responded within the critical time range. | |
| **Rationale:** The admin should analyse the log of the details stored and take the corresponding action. | |
| **Source:** Admin | |
| **Fit Criterion:** The admin should be able to find the log of the corresponding activity in the system. | |
| **Dependencies:** The admin should be able to analyse the log of any activity performed at any time. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

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| **Requirement #: FR5** | **Requirement Type:** Functional Requirement |
| **Description:** System should allow a user to choose his budget for choosing his medical practitioner. | |
| **Rationale:** The patient should be able to choose his budget to choose the ideal medical practitioner. | |
| **Source:** Patient, Help Centre | |
| **Fit Criterion:** The help centre should allot a medical practitioner as per the budget specified by the patient. | |
| **Dependencies:** There should be a medical practitioner available according to the budget specified by the patient. | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** None | |
| **History:** Created by Praveen Vinny on 13-March-2017 | |

**4. Non-Functional Requirements**

The requirements in this section provide a detailed specification of look and feel, usability, performance, operational, maintainability and portability, security, cultural and political requirements etc.,

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| **Requirement #: NFR1.1** | **Requirement Type:** Look and feel Requirement |
| **Description:** Help request to a help centre should be prominent and easy to find for the user. | |
| **Rationale:** Users should be able to find the option to raise a help request easily upon logging in into the system. | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners | |
| **Fit Criterion:** The option to raise a help request should be available in the home page. | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR1.2** | **Requirement Type:** Look and feel Requirement |
| **Description:** Emergency ambulatory service option should be legible and clearly visible for the user. | |
| **Rationale:** Users should be able to find the option to raise an ambulatory service easily. | |
| **Sources:** Patients, Help Service Assistants | |
| **Fit Criterion:** The option to raise an emergency ambulatory service should be available in the home page. | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR2** | **Requirement Type:** Usability Requirement |
| **Description:** System should be easy to use and all links should be accessible within the navigation of three mouse clicks. | |
| **Rationale:** Users should be able to use the system with ease. They should be able to access any functionality of the system within three clicks with the mouse. | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners | |
| **Fit Criterion:** Users should find the system easily navigable. | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR3** | **Requirement Type:** Operational Requirement |
| **Description:** There should be no option to disable internet-based medical monitors that give continuous readouts to help centre. | |
| **Rationale:** No user should be able to disable the function. | |
| **Sources:** Help Service Assistants, Medical Practitioners, Patients, Admin | |
| **Fit Criterion:** No one is authorised to disable the option | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR4** | **Requirement Type:** Performance Requirement |
| **Description:** The system should handle several help requests in parallel that compete for service by overlapping in time and space. | |
| **Rationale:** Should minimize user damage | |
| **Sources:** Patient, Help Service Assistants | |
| **Fit Criterion:** System should handle requests as much as possible. | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR5** | **Requirement Type:** Performance Requirement |
| **Description:** The system should support conflict resolution as per conflict resolution policies that minimises user damage. | |
| **Rationale:** Should minimize user damage | |
| **Sources:** Patients, Help Service Assistants, Admin | |
| **Fit Criterion:** System should resolve the conflicts. | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR6** | **Requirement Type:** Performance Requirement |
| **Description:** The system should have its data repository always up and running. | |
| **Rationale:** The data repository should be always available so that the patients and other stake holders can access the system and its details every time., | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners, Admin | |
| **Fit Criterion:** Database should be always up and running. | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR7** | **Requirement Type:** Performance Requirement |
| **Description:** The system should handle dynamic change of location and user | |
| **Rationale:** Conflicts due to dynamic change of number of users and location of users should be handled | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners | |
| **Fit Criterion:** The system should handle dynamic changes in the number of users or their locations of access. | |
| **Dependencies:** None | |
| **Rank of importance:** Medium | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR8** | **Requirement Type:** Maintainability and Portability Requirement |
| **Description:** The system should be open to new service installation. | |
| **Rationale:** The system should be designed to increase the scope. | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners, Admin | |
| **Fit Criterion:** Increasing the scope should be practically possible | |
| **Dependencies:** None | |
| **Rank of importance:** Essential | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR9.1** | **Requirement Type:** Security Requirement |
| **Description:** The system should not disclose the details of patients or any information stored in the database to any unauthorised user. | |
| **Rationale:** Unauthorised access shouldn’t be allowed. | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners, Admin | |
| **Fit Criterion:** The system should not allow access of the details within the repository to any unauthorised person. | |
| **Dependencies:** None | |
| **Rank of importance:** Medium | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Arun Kumaran on 13-March-2017 | |

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| **Requirement #: NFR9.2** | **Requirement Type:** Security Requirement |
| **Description:** The system ask user to login to use its functionalities. | |
| **Rationale:** Any functionality of the software should be accessible only after logging in into the system. | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners, Admin | |
| **Fit Criterion:** Access to the system should be available only after logging in. | |
| **Dependencies:** None | |
| **Rank of importance:** Medium | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Praveen Vinny on 21-March-2017 | |

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| **Requirement #: NFR10** | **Requirement Type:** Security Requirement |
| **Description:** The system should not allow traceability of links. | |
| **Rationale:** The system should not allow any user to login into the system or to access any information within the system by typing in the links generated previously during activities in the past. | |
| **Sources:** Patients, Help Service Assistants, Medical Practitioners, Admin | |
| **Fit Criterion:** The non-traceability of links should be maintained by the system. | |
| **Dependencies:** None | |
| **Rank of importance:** Medium | |
| **Supporting Materials:** Requirement Overview Document Provided. | |
| **History:** Created by Praveen Vinny on 21-March-2017 | |

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| **Requirement #: NFR10** | **Requirement Type:** Cultural and political requirements |
| Currently we do not have any cultural and political requirements. We may add those requirements during the later phases of this project if there arises any of them. | |

**5. Legal Requirements**

The regulation of medical device software and mobile medical applications that are medical devices is risk-based in the sense that the level of scrutiny and oversight by the TGA applied to a product will vary as per the level of risk that the product represents to the patient or healthcare professional using it. The potential risks arising from medical devices can be minor, or very significant indeed, depending on the nature of the device and its intended purpose.

Applications for inclusion of medical device software on the Australian Register of Therapeutic Goods (ARTG) are reviewed in accordance with the manufacturer's intended purpose and the way the product is to be supplied to health care professionals and the Australian public.

The therapeutic goods legislation requires manufacturers of medical device software products (other than those which are classified as Class 1 - the lowest risk classification) to obtain Conformity Assessment certification, while all medical devices, irrespective of classification, are expected to meet the Essential Principles for safety and performance.

The regulations make no distinction between different forms of software; all forms of software that meet the definition of a medical device must conform to the Essential Principles. For further information, please refer to Section 13 in Part 2 of the Australian Regulatory Guidelines for Medical Devices (ARGMD).

The above details are adapted from the official website of ARGMD mentioned in reference [5].

**6. Project Issues**

These details are not available at this early stage of development of this project. Developers of this product can append any details to this, if they encounter any issues with this.